

Outline: China's Space Ambitions and Future Goals

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China views space as an integral part of its comprehensive national power, with an intrinsic ability to influence global events. In April 2020, the powerful National Reform and Development Commission included space as a 'critical infrastructure' along with 5G broadband internet, artificial intelligence, and robotics. President Xi Jinping states that China's grand strategy is to become the lead nation in space and technology by 2049, in time to celebrate the hundredth-year celebration of the establishment of the People's Republic of China. While China's space program has always been a source of prestige and pride, President Xi raised it to the spirit of the long march in the 1940s that established communist China in 1949. In November 2012, in a visit to an exhibition titled "The Road towards Renewal" hosted at the National Museum of China in November 2012, Xi Jinping reflected on China's role in the world, his national rejuvenation concept, and his China Dream concept. For Xi, the 'China Dream' meant greater prosperity and security at home. "In the global prospect, the Chinese Dream will change the global landscape, which was shaped by Western countries over the past two centuries during industrialization..."¹ Xi believed that under his leadership, which is now for life under a 2017 amendment to the constitution,² his China Dream, which includes his space dream, will enjoy policy stability and benefit from long-term resource commitment. It is critical to understand that China's space investment forms a part of their grand strategy.

China's Space Goals

Funded annually with a budget of approximately \$8 billion,³ China's space goals include a Mars landing mission (2021),⁴ permanent space station (2022),⁵ lunar South Pole sample return (2024),⁶ reusable suborbital launch (2025),⁷ 100kW Space Based Solar Power (SBSP) demonstration at Low Earth Orbit [LEO] (2025),⁸ Mars sample return (2028),⁹ a Jupiter probe (2029),¹⁰ Near Earth Asteroid mission (2029), lunar South Pole survey (2030),¹¹ Long March 9 super heavy rocket (2030),¹² 1 mW of SBSP in

¹ "2014 Two Sessions: NPC & CPCPPCC", *Xinhua*, March 3, 2014,

http://www.chinadaily.com.cn/china/2014npcandcpc/2014-03/05/content_17324203.htm

² "Full Text of Resolution on Amendment to CPC Constitution", *China Daily*, October 24, 2017 at

http://www.chinadaily.com.cn/china/19thcpcnationalcongress/2017-10/24/content_33656521.htm; Also see Liu Mingfu, *The China Dream Great Power Thinking & Strategic Posture in the Post-American Era* (New York: CN Times, 2015).

³ Charlie Campbell, "From Satellites to the Moon and Mars, China is Quickly Becoming a Space Superpower," *Time*, July 17, 2019, <https://time.com/5623537/china-space/>

⁴ Jonathan Amos, "China Mars Mission: Tianwen-1 Spacecraft enters into Orbit," *BBC*, February 10, 2021, <https://www.bbc.com/news/science-environment-56013041>.

⁵ Tania Branigan and Ian Sample, "China Unveils Rival to International Space Station", *The Guardian*, April 26, 2011, <https://www.theguardian.com/world/2011/apr/26/china-space-station-tiangong>

⁶ "China unveils Follow-Up Lunar Exploration Missions", *Xinhua*, January 14, 2019, http://www.xinhuanet.com/english/2019-01/14/c_137743015.htm

⁷ "China Developing Reusable Space Rocket", *Xinhua*, April 30, 2018, http://www.xinhuanet.com/english/2018-04/30/c_137147249.htm

⁸ Xinbin Hou and Li Wang, "Recent SPS Activities in China", Qian Xuesen Laboratory of Space Technology, China Academy of Space Technology, 2nd Space Solar Power Satellite (SSPS) Workshop, February 13, 2019, Seoul, Korea.

⁹ Liu Jia, "China Plans Two Mars Missions by 2028," China Academy of Sciences, September 20, 2018, http://english.cas.cn/newsroom/archive/china_archive/cn2018/201809/t20180920_197605.shtml

¹⁰ Andrew Jones, "Jupiter Mission by China could Include Callisto Landing," *Planetary Society*, January 12, 2021, <https://www.planetary.org/articles/jupiter-mission-callisto-landing>

¹¹ "China Aims to Explore Polar Regions of Moon by 2030", *China Daily*, September 25, 2018,

<http://www.chinadaily.com.cn/a/201809/25/WS5ba9f615a310c4cc775e801f.html>; Also see Dennis Wingo, *Moon Rush: Improving Life on Earth with the Moon's Resources* (Lancaster: Apogee Books, 2004).

¹² Eric Berger, "China Officially Plans to Move Ahead with Super-Heavy Long March 9," *Ars Technica*, February 24, 2021, <https://arstechnica.com/science/2021/02/china-officially-plans-to-move-ahead-with-super-heavy-long-march-9-rocket/>

GEO (2030),¹³ Asteroid return (2034), test key technologies like 3D printing to lay groundwork for the construction of a lunar base (2035), 100 mW SBSP with electric power generating capacity (2035), lunar research base (2036), nuclear powered space fleet (2040),¹⁴ SBSP to orbit (36,000 kms) above Earth and start generating power (2040), Earth-Moon Economic Zone (2050)¹⁵ and first Commercial level operational SBSP in GEO (2050).¹⁶ The fact that China has met past deadlines for space goals set decades ago; an SBSP plant (2019),¹⁷ lunar far side landing (2019),¹⁸ Mars mission launch (2020),¹⁹ lunar sample return (2020),²⁰ independent Global Positioning System (2020),²¹ lends credibility to these future goals set by China's leading state owned space agencies.

China's Space Capacities

Civilian, Military, Commercial

China has independent space launch capability, demonstrated human presence in Low LEO, achieved humanity's first landing on the lunar far side, and launched its second independently conceived Mars mission. On June 23, 2020, China launched the 55th satellite of its BeiDou Navigation System (BDS), now a fully independent self-reliant Global Navigation Satellite System (GNSS) as an alternative to the U.S. Space Force-maintained Global Positioning System (GPS). With this launch, "China is now able to extend influence in a multidomain environment (land, sea and space) via its BeiDou space system, which provides navigation to aircraft, submarines, missiles, as well as commercial services dependent on such navigation".²² In 2016, China launched the world's first quantum un-hackable satellite communications system called Micius.²³ China's latest rocket the *Long March 5*, is capable of launching 14 metric tons to geostationary orbit (GEO), 25 tons to Low Earth orbit (LEO), and 8.2 tons to trans lunar injection, successfully launched in December 2019. The *Long March 8*, launched December 2020, is a first step towards reusability of its first stage and side boosters on a later date.²⁴ China is developing the *Long March 9*, its super heavy lifter designed to carry a payload of 140 metric tons to LEO, a 50-ton

¹³ Xinbin Hou and Li Wang, "Recent SPS Activities in China".

¹⁴ Stephen Chen, "China's Nuclear Spaceships will be 'Mining Asteroids and Flying Tourists' as it aims to overtake the US in a Space Race," *South China Morning Post*, November 17, 2017, <https://www.scmp.com/news/china/policies-politics/article/2120425/chinas-nuclear-spaceships-will-be-mining-asteroids>; "China to Achieve "major breakthrough" in Nuclear-Powered Space Shuttle Around 2040: Report", Xinhuanet, November 16, 2017, http://www.xinhuanet.com/english/2017-11/16/c_136757737.htm

¹⁵ "Exploiting Earth-Moon Space: Chinese Ambitions after Space Station", Xinhua, March 08, 2016, http://m.chinadaily.com.cn/en//2016-03/08/content_23775949.htm

¹⁶ Xinbin Hou and Li Wang, "Recent SPS Activities in China".

¹⁷ Pan Zhaoyi, "China Starts to Build World's First Space Based Solar Power Plant," CGTN, February 18, 2019, <https://news.cgtn.com/news/3d3d514f34597a4e32457a6333566d54/index.html>.

¹⁸ Davide Castelvecchi, "China Became First Nation to Land on the Moon's Far Side," *Nature*, January 3, 2019, <https://www.nature.com/articles/d41586-018-07796-x>

¹⁹ Mike Wall, "China Launches Ambitious Tianwen-1 Mars Rover Mission," *Space.com*, July 23, 2020, <https://www.space.com/china-tianwen-1-mars-mission-launch.html>

²⁰ Andrew Jones, "China's New Moon Mission Returns the First Lunar Samples since 1976," *National Geographic*, December 16, 2020, <https://www.nationalgeographic.com/science/article/china-launches-first-moon-sample-return-mission-in-over-40-years>

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²² Namrata Goswami, "The Economic and Military Impact of China's BeiDou Navigation System", *The Diplomat*, July 1, 2020, <https://thediplomat.com/2020/07/the-economic-and-military-impact-of-chinas-beidou-navigation-system/#:~:text=By%20Namrata%20Goswami&text=On%20June%2023%2C%202020%2C%20China,for%20its%20BDS%20navigation%20constellation>

²³ Karen Kwon, "China Reaches New Milestone in Space-Based Quantum Communications," *Nature*, June 25, 2020, <https://www.scientificamerican.com/article/china-reaches-new-milestone-in-space-based-quantum-communications/>

²⁴ Rui C. Barbosa, "Long March 8-a future reusable rocket-conducts debut launch," *NASA Spaceflight.com*, December 22, 2018, <https://www.nasaspaceflight.com/2020/12/long-march-8-debuts-nine-satellites/>

spacecraft to a lunar transfer orbit and a 44-ton payload to Mars transfer orbit.²⁵ By 2040, China aspires to develop nuclear propelled spacecrafts.²⁶

China has invested in developing its military space capacity specially to augment its Military Command and Control (CnC), Precision Navigation and Timing (PNT) for independent missile launch and tracking, as well as sea-based launch for avoiding detection. In 2007, China tested its Anti-Satellite (ASAT) capability. Such capabilities have since been enhanced to include the 2013 testing of a robotic arm that can grab another satellite.²⁷ Open sources report that the PLA Strategic Support Force (PLASSF), established 2015, is training with ASAT missiles aimed at U.S. satellites.²⁸ These ASAT includes the variant of the HQ-19 surface to air missile, (utilized in tests in 2007, 2010), the DN-2 (2013) and the DN-3 (2015, 2016, 2017).²⁹ The SC-19, modeled on the DF-21C ballistic missiles is China's primary ASAT weapon, ranging between 2, 150kms-2, 500 kms.³⁰

In the commercial sphere, Chinese private space companies like OneSpace have already launched to space in 2019 and has plans for developing reusable rockets. In August 2019, Linkspace experimented with a reusable launch vehicle, when its rocket reached a height of 300 meters above ground and then landed back intact.³¹ Within the last two years (2018 onwards), China has seen investments upto \$2 billion annually in its private space sector.

This brief outline of my work on China's space program offers insights into the trajectory of China's space program.³² For China, investing in space has both reputational, military and economic benefits, with space scientists, engineers and entrepreneurs keenly aware of the trillions of dollars' worth space future by 2050. Their grand strategy is holistic with a combination of the strategic dimensions of power projection, economic returns, diplomatic influence, and global status that space technology brings to China. China has expressed dissatisfaction with a U.S. led global order and is working tirelessly on all fronts to establish itself as the lead actor in space and the world by 2050, a goal it views as reminiscent of its history and its future.³³

²⁵ Zhao Lei, "Super Powerful Long March 9 Said to Begin Missions around 2030," *China Daily*, March 11, 2019.

<http://www.chinadaily.com.cn/a/201903/11/WS5c859b62a3106c65c34edcc0.html>

²⁶ "China to Achieve "major breakthrough" in Nuclear-Powered Space Shuttle Around 2040: Report", Xinhuanet, November 16, 2017, http://www.xinhuanet.com/english/2017-11/16/c_136757737.htm

²⁷ Marcia Smith, "Surprise Chinese Satellite Maneuvers Mystify Western Experts," Spacepolicyonline.com, August 19, 2013, <https://spacepolicyonline.com/news/surprise-chinese-satellite-maneuvers-mystify-western-experts/>

²⁸ National Air and Space Intelligence Center, "Competing in Space", December 2018, <https://media.defense.gov/2019/Jan/16/2002080386/-1/-1/1/190115-F-NV711-0002.PDF>, p.21.

²⁹ Ibid.

³⁰ "SC 19 Anti-Ballistic Missile Interceptor," Global security.org, <https://www.globalsecurity.org/space/world/china/sc-19-abm.htm>

³¹ "China Successfully Launches Largest Reusable Rocket," *Global Times*, August 10, 2019, <https://www.globaltimes.cn/content/1160951.shtml>.

³² Statement of Dr. Namrata Goswami Independent Senior Analyst and Author 2016-2017 Minerva Grantee Before the U.S.-China Economic and Security Review Commission Hearing on "China in Space: A Strategic Competition?" April 25, 2019, <https://www.uscc.gov/sites/default/files/Namrata%20Goswami%20USCC%2025%20April.pdf>

³³ Liu Mingfu, *The China Dream Great Power Thinking & Strategic Posture in the Post-American Era* (New York: CN Times, 2015).